Prince in many of the works which he undertook to promote education, science, and art. . . . In all my future intercourse with the Prince, I never on any occasion saw him animated by a single desire that was not connected with the public weal. . . . Only those who had the honour of his confidence can fully know the purity, ability, and simplicity of his character."

The history of the Great Exhibition of 1851, of the many difficulties satisfactorily surmounted, and of the grand final success, are all graphically told, including the celebrated story of the "Junk Chinaman" dressed up to represent a "yellow jacket" mandarin, and placed in the procession between the Archbishop of Canterbury and the Duke of Wellington! Greater than his services to the Exhibition were those which he bestowed on the appropriation and consolidation of the large funds placed at the disposal of the Royal Commissioners. Without the advice and the business capacity of Playfair this fund, now large and altogether devoted to purposes of science and art, would have been in danger of being frittered away, if not lost. "Nobody but yourself," writes the Prince of Wales to Playfair in 1889, "could have got us out of the serious pecuniary embarrassments in which we found ourselves placed."

"So long as South Kensington continues to exist in its present state, there will be no need to raise any monument to the memory of Lyon Playfair."

The letters and memoir contain interesting descriptions of professorial life at Edinburgh. He does not scruple to dilate on some amusing but not very creditable University squabbles in which he was often called upon to act as arbitrator. Then comes his Parliamentary career in both Houses, the details of which are both interesting and entertaining. How he represented the Universities of Edinburgh and St. Andrews. How he retired from this constituency in consequence of the Government putting Scotch education under a Scotch Secretary. How he was elected for South Leeds, "a working-man's constituency, where he received an almost enthusiastic appreciation, which quickly developed into a feeling of warm confidenec and affection."

As Chairman of Committees in the Commons, he had hard times in consequence of Irish insubordination. But he did yeoman service in speaking out strongly and fearlessly about the follies and the crimes of the Anti-vivisectionists and the Anti-vaccinators. The correspondence which occurs throughout the volume with persons of all ranks is full of interesting matter. The letters to his wife and children, and to the members of the Russell family, show the depth of his feelings, although, as one of his children writes:

"No letter he ever wrote could give an idea of his deep and intense sympathy, of his loving help in any trouble to those dear to him, and even to strangers. I never in the whole of my life have seen him cross or impatient, or known him speak a harsh word to any one."

Then his sense of humour was keen, and his powers as a *raconteur* were of the first order, and not the least interesting portion of the memoirs is that in which these powers are shown by the numerous anecdotes with which the volume abounds. Altogether the book is one which will be found full of interest, as giving a striking picture of a wonderfully full and varied life. H. E. R.

## THE GOLD-FIELDS OF ALASKA.

*Alaska and the Klondike: a Journey to the New Eldorado, with Hints to the Traveller, and Observations on the Physical History and Geology of the Gold Regions, the Conditions of Working the Klondike Placers, and the Laws governing and regulating Mining in the North-west Territory of Canada.* By Angelo Heilprin, F.R.G.S., F.G.S.A. Pp. 315; with 35 plates from photographs, and 3 maps. (New York: D. Appleton and Co. London: C. A. Pearson, 1899.)

THE search for gold still holds something of the romantic glamour which has surrounded it from the earliest days of our civilisation. It is true that modern conditions have enmeshed the winning of gold from vein and banket, reducing it, like diamond-mining, to a systematised industry scarcely more inspiriting to the labourer himself than the mining of coal or ironstone. But placer-deposits still offer a possible chance of sudden riches to the man possessed only of bodily vigour and a few simple uncostly implements, and men's imaginations still take fire whenever the rumour reaches them that the old conventional symbol of wealth is to be had for the digging. And still, as in the ancient days, the greater the difficulties to be overcome, the stronger to the adventurous spirit seems the probability of success. So when, in 1896-7, through an ever-widening circle, was spread the news of rich discoveries of the precious metal in a remote and barely accessible corner of north-western America, thousands were found ready to cast aside their everyday pursuits and make, in the words of the wise Camillo,

"a wild dedication of themselves
To unpathed waters, undream'd shores, most certain
To miseries enough."

To any one knowing anything of the land, the newspaper information which led to the rush seemed strangely inadequate and misleading—a characteristic compound of half-truths, whole truths and untruths, out of which stood the bare fact that placers of unusual richness had been found. What was heedlessly lost sight of in the excitement was that this discovery was not the sudden outcome of a single traverse of a previously unknown Golden Land, but had been attained only at the end of twenty years of persistent exploration, during which, though in the aggregate much gold had been won, the average net individual gain had been rarely more and often less than "day-wages."

As usual, these initial stages (unmentioned in the volume before us) attracted little or no attention from the outside world, for the restless spirits who undertake the hardships of pioneer life in the unbroken wilderness, though perhaps *too* fluent in speech, write no descriptions of their journeyings. Almost everywhere these men penetrate in advance of the "original explorer," who often in his own narrative forgets to mention their presence; but unless some unusual happening brings their doings into prominence, their traces in the land they have traversed are slight. In this instance it was surely a matter for prime consideration that a body of more or less experienced men—in numbers, according to a table published recently in the eighteenth Annual Report of the U.S. Geological Survey (p. 132), rising from 50 in 1882 to 1000 in 1894, and to 1700 in 1896—should for many years have been prospecting up and down the Yukon from its mouth nearly to its sources with only moderate success. This in itself was sufficient to show that the riches of the land were neither unlimited nor easily attained, and that most of the tyros in gold-hunting who made their laborious march in the wake of these men must do so in vain. According to Prof. Heilprin, "probably not less than thirty-five thousand to forty thousand people, possibly even considerably more, have in the short period following the discovery of gold in the Klondike region already passed to or beyond the portals of what has not inaptly been designated the New Eldorado. To some of these a fortune has been born; to many more a hope has been shattered in disappointment."—And how could it be otherwise?

The sudden movement of this great army, made up of units marching independently and without organisation, with self-interest as the only motive, into the heart of a wild land incapable of furnishing more than a very small number with the barest elements of sustenance, dependent therefore for their very existence upon supplies from a base many hundreds of miles away, possesses extreme interest to the student of economics and sociology; and perhaps the chief value of Prof. Heilprin's book is that it contains the record of a certain stage in the transient and unstable conditions which arose under these circumstances. That within the space of a few months this transplanted social mass should with scarcely any disorder have struck root amid novel and arduous surroundings, and by the play of individual interest alone should have found itself provided with all the actual necessaries, and many—indeed, too many—of the luxuries of life (brooms and window-glass being, according to Prof. Heilprin, the chief things lacking) is, in its way, as remarkable an object-lesson as the century has afforded. At no previous period in human history could this have happened, and it is all the more deserving of careful record. The flood of hazily inaccurate or wilfully misleading information from the newspaper press is past; we have reached the second stage at which, as in the volume before us, the underlying facts emerge; and there will follow, no doubt, in the fulness of time, the brightly coloured growth of fiction which imaginative writers will cultivate for our entertainment around the picturesque elements of the movement when its sordid details are forgotten.

As for the actual contents of Prof. Heilprin's book, it aims to place before its reader the impressions of one accustomed to examine critically and record accurately, during a tour to the Klondike by the Upper Yukon route, made under favourable circumstances between the end of July and the middle of October of last year. Prof. Heilprin went in from tide-water at Skaguay by the White Pass to the head of inland navigation on Lake Bennett in a day and a half, and came out, late in the season, by the Chilkoot Pass in one day with comparative ease, and concludes that the difficulties of both trails have been greatly exaggerated.

"To a mountaineer or traveller of ordinary resource neither the White Pass nor Chilkoot Pass will appear other than it actually is—*i.e.* a mountain pass, sufficiently rough and precipitous in places, and presenting no serious obstacle to the passage of man, woman, or child" (pp. 15–16).

But he justly observes that what to a person in his own circumstances seemed easy enough, both in these passes and on the trails of the interior, might wear a very different aspect to the man struggling onward with a load of 60 or 80 lbs. on his back In fact, all through the book we realise that the impressions are those of one travelling in ordinary tourist fashion, light and with sufficiency of means, and that the prospector mentioned on p. 177, "who was moving by slow stages, and without assistance of any kind, an equipment weighing somewhat over 400 lbs." would have another tale to tell.

However, with the completion of the railway in course of construction on the White Pass route, the journey to Dawson City becomes simply a matter of the payment of fares. Already, we learn from the newspapers, the journey from Vancouver to Dawson has been made in so short a time as six days, while from eight to twelve days is now ordinarily the length of the through trip.

From Lake Bennett Prof. Heilprin went by river-boats down the lakes and the Lewes or Upper Yukon River to Dawson in 4½ days, reaching the last-mentioned place on August 6. Here he took quarters in the recently opened "foremost hotel of the land," paying 35 dollars per week for his scantily furnished room, and 25 to 35 dollars per week more for board. He estimated the number of inhabitants of the two-year old city at 16,000, and this sudden concentration of humanity ahead of the resources of the country had, necessarily, curious consequences upon the relative values of merchandise. Thus we read (p. 101), that chickens "earlier in the season had sold for 100 dollars for three," but later "were obtainable at 10 dollars apiece"; eggs were 2½ dollars per dozen; radishes 75 cents a bunch of five pieces, and so on; while at the same time at the auction rooms many articles could be bought for less than the original outside cost (p. 104). But with regard to the enhanced value of food-stuffs, it may be well to mention that the Canadian Geological Surveyors, who were in Dawson during the same summer, state in their report that "it was found quite possible to purchase provisions at retail prices at the stores, for the maintenance of a party, at less than a dollar a day per man (Rep. Geol. Survey of Canada for 1898, p. 62).

That the conditions were peculiarly evanescent, and with the establishment of Dawson City as a distributing centre are not likely to be repeated in the district, should make the fluctuations of the Dawson markets during the last three years an instructive chapter in economics.

One notices at times in Prof. Heilprin's book an unpleasant oblique mode of expression, not uncommon in the literature of forty years ago, but now happily rare. This is especially pronounced in the chapter on the inhabitants of Dawson, as, for example, in the passages describing "Sir ——," "Count C——," the "professor-doctor" and the "Gold Commissioner" (pp. 110–112).

The author notes that the number of blacklegs was surprisingly small, and remarks on "the feeling of security which every one seems to experience and enjoy." This he ascribes in great measure to the efficiency of the Canadian military police, and comments on "a condition so wholly different from that which but a few weeks before dominated the atmosphere of Skaguay and the American side of the trails" (p. 119).

In praising the summer climate of the Klondike Prof. Heilprin waxes enthusiastic—

> "From August 6th to September 20th, barring three days of partial rain, and perhaps a fourth of cloudiness and mist, the weather was simply perfection—a genial, steady, mild summer with a temperature rising at its highest to about 80° or 82° F. in the shade. . . . In August . . . the evenings were but little less pleasant than the days, the balmy night air rarely necessitating clothing warmer than that ordinarily worn" (p. 70).

Neither did he personally experience any trouble from mosquitoes. He also thinks that the rigour of the winters has been exaggerated, as "most of the Dawsonites are inclined to make light of the winter's cold, and assure you that, except for head and foot wear, they take little stock in that over-burdening with heavy clothing which outfitters so delight in foisting, as 'absolute necessities,' upon the too credulous tenderfoot" (p. 73).

In short, there appears to be nothing in the region inimical to the permanent residence of civilised man the year round in comparative comfort. Even the agricultural possibilities of the country are spoken of hopefully (p. 83), and Dr. Dawson's previous favourable estimate in this direction is quoted with approval (p. 85).

As to that which to most people constitutes the sole interest of the region—its future possibilities for gold-production—Prof. Heilprin, while writing with somewhat oracular caution, takes on the whole a sanguine view. After describing the conditions and methods of working the placers which differ, in the frozen state of the subsoil and in some other particulars, from any placers hitherto worked on the continent except those of Cassiar in the northern part of British Columbia, and after pointing out that some of the best claims, viz. those of the hillsides and high benches, were located in the early part of 1898, at the time when the incomers had been warned that the region for a hundred miles or so about Dawson had been fully staked and occupied, the author concludes that "many good locations in the Klondike territory are still open, although it may not be easy or possible to say just which they are" (p. 207). This, we fear, will seem rather "thin" guidance to the anxious gold-seeker! The output of the past year Prof. Heilprin estimates to have been "in the neighbourhood of nine or ten million dollars, perhaps more; but that it will be vastly greater in the current year (1899) is certain" (p. 204). Like other investigators of the district, he thinks that capital judiciously expended in hydraulic-mining should yield profitable returns.

A summary of the Canadian laws regulating mining in the Yukon region forms one of the most useful chapters in the book.

The longest chapter is that which deals with the physical history and geology of the Klondike gold-fields (Chapter xi. pp. 212–280), and this is, perhaps, the least satisfactory part of the volume. To the general reader it may indeed be of some service; but to the student of geology or of physiography more adequate sources of information are available, and the chapter contains little that need detain him, especially since though passing mention is made of previous investigators exact references to their works are rarely given. Besides the early scientific descriptions of the Yukon country by Dawson, McConnell, Russell and others, the recently issued report of the Canadian Geological Survey for 1898 includes (pp. 55–62) a concise and practical summary of the geology and conditions of the Klondike gold district by those excellent observers Messrs. R. G. McConnell and J. B. Tyrrell, which gives a clearer view of the structure of the country than the volume before us; and the eighteenth Annual Report of the U.S. Geological Survey (Part iii. pp. 101–391) contains an elaborate memoir on "the Geology of the Yukon Gold District" by Mr. J. E. Spurr, with a particularly interesting preliminary chapter, previously referred to, on "the history and condition of the district to 1897," and a discussion of the drainage peculiarities, by Mr. H. B. Goodrich. To these works, then, rather than to Prof. Heilprin's book, the scientific student should turn for information.

Prof. Heilprin, after much discussion of the subject, comes to the conclusion that "the known facts of the Klondike region, so far as they relate to the primal origin of the gold in the placers, favour the theory of chemical solution and precipitation, as opposed to the generally accepted view of accumulation from disintegrated reefs, bodies or veins" (p. 280).

But his arguments are unconvincing, and his views are neither shared by Spurr for the placers on the American side of the frontier, nor by McConnell and Tyrrell, the latter investigators stating that "the gold in the Klondike has certainly been derived from the rocks of the immediate vicinity" (Rep. Can. Survey, *op. cit.*, p. 60). It is of course evident that during whatever time the rich ground may have remained permanently frozen, no percolation of the supposed solutions can have taken place.

With regard to the auriferous high-level deposits, Prof. Heilprin adopts a view similar to that held by Spurr to account for the high benches of the American side, viz. that they are "evidences of the past existence of large lake-like bodies of water, perhaps even of a vast inland sea" (p. 226). On this supposition he builds various speculations, and thinks that the old shores have formerly been of far greater extent and have yielded by condensation much of the gold of the valley placers. But Messrs. McConnell and Tyrrell offer a more simple and adequate explanation of the phenomena in question, as follows:—

> "On Bonanza and Eldorado creeks, and doubtless also on a number of the other creeks that rise in the high land near the Dome, the work of concentration has been greatly expedited by small local glaciers, which, at a period not very remote, have originated at the heads of these creeks, and have filled the bottoms of their valleys through parts at least of their lengths. Thus the Eldorado glacier would appear to have had a greatest thickness of about 200 feet at French Gulch, and to have joined the Bonanza glacier at the Forks, below which both continued on some distance together. The gravel that fills the bottom of the valley from side to side is a typical glacier-wash, having been deposited by the stream which flowed from the face of the glacier. The lower benches on Bonanza Creek were also deposited in a similar way, but the higher so-called benches have been formed either as lateral moraines along the sides of the glacier, or by

streams which flowed between the side of the glacier and the bounding slope of the valley" (Rep. Can. Survey, 1898, p. 61).

There are no existing glaciers in the Klondike region, and while the former presence of small local valley-glaciers has been recognised, all the observers are agreed as to the absence of any trace of widespread glaciation. This probably implies that, as in Siberia, the climate throughout the Glacial Period was dry, and that then, as now, heavy precipitation was confined to the vicinity of the coast.

To sum up our impressions of this book, Prof. Heilprin may be complimented on having given us a vivid picture of transient conditions in the Klondike; but, from a physical standpoint, his work can scarcely be taken as a solid contribution to our knowledge of the district.

The numerous excellent reproductions of photographs with which the book is illustrated are for the most part well adapted to show the general character of the scenery and conditions, though now and again a picture is introduced for effect rather than for instruction. The deep yellow binding with its pictured dog-trains, reminiscent of the "yellow press," is not particularly happy. G. W. L.

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## A NEW TEXT-BOOK ON CHEMISTRY.

*Inorganic Chemistry for Advanced Students.* By Sir Henry E. Roscoe, F.R.S., and Arthur Harden, Ph.D. Pp. 432. (London: Macmillan and Co., Ltd., 1899.)

THIS book is intended to supplement "Chemistry for Beginners," which was published about six years ago by Sir Henry Roscoe, with the assistance of Mr. J. Lunt. It is not a complete treatise on the elements of inorganic chemistry, but part of a complete treatise. It is intended for students who have already gained a little knowledge of the subject, and those who would use it must first learn something about oxygen, hydrogen, chlorine, carbon, and their simpler compounds, and about many other matters, either from "Chemistry for Beginners" or from some other suitable elementary work.

We suppose that a small text-book is put into the hands of most beginners when they reach the stage at which they need such a book, and that presently, when they are older and more advanced, this small book is changed for one of the larger treatises. Now, at this latter stage a certain amount of confusion and some loss of time are very apt to occur owing to the overlapping of the contents of most elementary and advanced works on chemistry, and to the fact that the majority of young students are not able to skip with discretion. It is evident that this confusion and loss of time might be avoided by the use of two books, such as those which have now been provided by Sir Henry Roscoe and his colleagues, Dr. Harden and Mr. Lunt; and we believe that those who have had much experience in teaching chemistry under school conditions will at once recognise the merits of their method of dealing with the subject in two volumes, one quite elementary, one more advanced, and each the complement of the other.

The present volume, like its predecessor, follows in the main the lines laid down so successfully a generation ago in the familiar "Roscoe's Chemistry." That is to say, the book is intended for students who want to learn the fundamental principles of chemistry, and something about its methods and its data, rather than for those who desire to use the subject as part of a system of mental gymnastics. But though the new book follows lines which have so long been made familiar to us by the previous work of its eminent senior author, it differs from that earlier work in several respects, notably in its somewhat more limited scope, for organic chemistry finds no place between its covers, in the greater attention given to chemical theory, and in the fact that a great number of experiments for the student are described in the text.

The subject-matter of the volume is divided into thirty-nine lessons, the elements treated of being grouped in such a manner that from the beginning the student may be said to be preparing the way for his subsequent study of the periodic system of classification. The chapters on chemical theory are dispersed among the rest. This arrangement may, perhaps, seem open to the objection that the student's reading in certain subjects may be somewhat broken up; but the authors have adopted it, as they tell us in their preface, with the object of relieving him of the tedious task of working without a break through a long series of metals and their compounds. The parts of chemical theory chiefly discussed in these lessons are atomic and molecular weights, equivalents, specific and atomic heats, crystals and isomorphism, valency, the constitution of hydroxides and oxyacids, dissociation, thermochemistry, electrochemistry, the periodic law and spectrum analysis. There are questions to be worked out, and numerous summaries. We are not quite convinced that so many of these latter make for sound learning. Should not every student prepare a good many of his own abstracts after he has read a few chapters and compared them with some summaries provided as examples? This, however, is a small matter, as it is obvious that the existence of summaries in the text need not prevent any student from constructing his own abstracts during his reading. We feel sure that the new book will be welcomed by those who are familiar with its predecessor, and by many others, and we wish it and its companion volume all success. W. A. S.

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## OUR BOOK SHELF.

*Elements of Natural Philosophy.* By Alfred Earl, M.A. Pp. viii + 320. (London: Edward Arnold, 1899.)

MR. EARL is already well-known as the author of the admirable "Practical Lessons in Physical Measurement," and one naturally examines a new book of his with great expectations. The preface states that the present volume is "intended as a handbook for the laboratory," and "has been written for the use of beginners." The book does not, in our opinion, exactly fulfil these conditions; yet it may still prove of use, though rather to teachers than taught. A laboratory manual should give clear, precise instructions as to what the student has to do—guidance of a sufficiently explicit nature for the pupil to work from without unduly bothering the teacher, who, very often, has too large a number working at the same time for purely individual instruction. Yet, in dealing with the measurement of simple quantities, for example, Mr. Earl gives some nineteen pages of general descrip-